REMARKS

Reexamination and reconsideration of the pending claims as amended in light of the following remarks is respectfully requested. As applicable, references to the instant patent application text and figures are made by citing to United States Patent Application Publication No. 2004/0224288 A1 (published on November 11, 2004).

I. AMENDMENTS

Claims 1-22 are pending. Claims 1-22 have been amended to improve their form.

Support for the amendments may be found in the application as published. Accordingly, these amendments do not raise an issue of new matter and entry thereof is respectfully requested.

II. REJECTIONS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 1-5, 9, 10, and 12-22 stand *"rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention"* (see the Office Action at page 2).

The Examiner has rejected the claims due to the references to "μ" rather than μm. Applicant has amended the claims as suggested to reflect that measurements are in microns/micrometers.

To further prosecution, the symbol "μ" has been amended to include reference to meters (i.e., μm) referring to microns. Applicant notes that the term "micron" and the symbol "μ" are used interchangeably throughout the application as filed. Micron (or

"μ") means micrometer, a.k.a. millionth of a meter, a.k.a 10^{-6} m, and finally a.k.a μm (see also the definition of the word *micron* in Stedman's Medical Dictionary, 26th Edition, Williams & Wilkins, Baltimore, MD, USA).

The Examiner has also rejected the claims on the basis of references to "ISO" standards. Applicant notes that ISO standard measurements are commonly used as short-hand by practitioners, and generally in the field of dentistry to which this invention pertains, to refer to the diameter of instruments to be inserted in the root canal in root canal procedures. These are standard references which are adopted by ISO. These standards are known and clearly understood by those in the field. A specific ISO specifies the taper and tip diameter requirements for root-canal instruments and obturating points. An ISO designation also specifies the dimensions and compositional requirements for prefabricated metal root-canal files and polymeric points or cones suitable for use in the obturation of the dental root-canal. An ISO also specifies numerical systems and a color coding system for designating the sizes of instruments to be used for root-canal procedures. To anyone skilled in the art of endodontics, an ISO value denotes a fixed set of known parameters (see e.g., J.I. Ingle & L. K. Bakland, Endodontics, 4th Edition, Williams & Wilkins (1994) – Attachment A).

Accordingly, Applicant submits that the amended claims comply with the requirements set forth in 35 U.S.C. § 112, first paragraph as they do particularly point out and distinctly claim the subject matter which applicant regards as the invention. On the basis of the amendments and remarks reconsideration and withdrawal of these rejections are courteously requested.

III. REJECTIONS UNDER 35 U.S.C. § 103(A)

Claims 6 and 8-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy (U.S. Patent No. 5,622,501) in view of Okamoto *et al.* (U.S. Patent No. 4,979,900).

Applicant avers that the teachings of Levy in view of Okamoto *et al.* do not render the claimed invention obvious for several reasons as discussed below.

Levy is purportedly directed to a tip to facilitate the widening of tooth canals by laser radiation via ablation or vaporization of tissues. (see Col. 1, lines 52-53). For this purpose, Levy proposes a tip which is tapered. In this context, Levy provides that *"if a suitable taper is imparted, laser radiation energy is emitted over the length of the tapered region and is thus spread out along an extended section of the region being treated"* (see Col. 4, line13 *et seq.*). Tapering is *"particularly advantageous for root canal widening (again, via ablation and/or vaporization), or shaping operations [...] without such taper, the radiation is concentrated at the output end of the fiber"* (see Col. 4 lines 17 *et seq.*, underline added for emphasis). In fact, Levy teaches that such concentration would tend to produce a ledge, or notch, in the canal wall. Thus, according to Levy, tapering is crucial for those tips to be inserted in the root canal (*supra*).

Levy's teachings are wholly irrelevant, and actually contrary to the goals of Applicant's invention. In fact, Applicant's invention (because of the characteristics of the surface of the optical probe) does not rely on the tapering *per se* to avoid concentrating radiation on the tip at the output end of the optical probe. To distribute radiation, the instant invention relies on the use of an optically diffusive surface dispersing (sub ablative and sub-vaporative) near infrared optical energy throughout, laterally and along the entire length of the tip according to the amended claims. While

the tip is tapered in certain embodiments, it does not need to be tapered to function as devised by the Applicant as a primary mechanism for "full tooth" biofilm thermolysis.. This is so because Applicant's tip is otherwise configured (e.g., via roughening for scattering and diffusion) to enable optical energy modulation.

Levy claims to utilize the ability of Nd:YAG laser radiation to vaporize dark material to *"selectively destroy bacteria which might be present on tooth or gum surfaces and which will, if undisturbed, cause decay or infection"* (see Col. 6, lines 35 *et seq.*). In fact, Levy provides that bacteria to be eliminated must to be stained to a dark color with a selective stain, and subsequently exposed to a relatively low energy laser radiation which is sufficient to vaporize the bacteria (*idem*). Levy, just like many others in the field, has sought a method to differentially target bacteria while leaving the substrate tissue (e.g., the patient's tissues) unaffected by using staining methods and target laser radiation to stained bacteria. At Col. 6, lines 58 and 59, Levy provides that *"[w]ithout such staining, achievement of similar result would require an energy level of the order of 100 mJ."*

The present invention does not rely on staining to target bacteria. The present invention relies on the photobiology of the near-infrared energy to thermally coagulate the residual biofilm (hence entrapping and killing the bacteria) within all of the dentinal tubules that was not removed chemically and mechanically through traditional root-canal methods. Known methods using Nd:YAG lasers and near infrared solid state diodes are hindered by either (a) the need to stain bacteria with a selective stain to direct radiation absorption to the stained bacteria; or (b) the need to impart a considerable amount of energy (and concomitant damage to the surrounding patient's tissues) in order to achieve thermolysis since bacterial death (following Levy's patent)

is wholly a function of heat depositiont. These problems stem from the fact that the relevant wavelengths are virtually transparent to oral flora. With Levy, the energy cannot be dispersed in the manner of the current invention to gently (without vaporization or ablation) coagulate and thermolyze the remaining biofilm in the dentinal tubules, and trap and kill the bacteria.

To solve this problem, Applicant has thought of a method to augment existing tips to scatter and diffuse optical energy, thereby lowering the required power output from the tip (i.e., at sub-ablative and sub-vaporative energy levels) and increasing the time available for the reduction of biofilm/bacteria.

Levy does not teach or suggest a tip having an optically diffusive surface dispersing optical energy throughout 360° laterally and along the entire length of the tip according to the amended claims. Okamoto *et al.* does not cure this deficiency.

For these reasons, it is submitted that the amended claims are not obvious over Levy in view of Okamoto *et al.* Accordingly, reconsideration and withdrawal of these rejections is kindly requested in light of the foregoing remarks.

Claims 1-5, 7 and 12-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy (U.S. Patent No. 5,622,501) in view of Okamoto *et al.* (U.S. Patent No. 4,979,900) as applied above and in further view of Kataoka *et al.* (U.S. Patent No. 5,374,266), Nakajima *et al.* (U.S. Patent No. 5,300,067) and Rizoiu *et al.* (U.S. Patent No. 5,741,247).

Applicant avers that the invention of claims 1-5, 7 and 12-22 as amended are non-obvious in light of Levy in further view of Okamoto *et al.* and in further view of Kataoka *et al.*, Nakajima *et al.* and Rizoiu *et al.* for the same reasons set forth above.

Accordingly, withdrawal of the above-recited rejections and reconsideration of the claims as amended are kindly requested.

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CONCLUSION

In light of the amendments and remarks herein, Applicant submits that the claims are now in condition for allowance and respectfully requests a notice to this effect. The Examiner is invited to contact the undersigned if there are any questions.

A Request for a Three (3) Month Extension of Time, up to and including November 3, 2005 is included herewith. Pursuant to 37 C.F.R. § 1.136(a)(2), the Examiner is authorized to charge any fee under 37 C.F.R. § 1.17 applicable in this instant, as well as in future communications, to Deposit Account 50-1133.

Furthermore, such authorization should be treated in any concurrent or future reply requiring a petition for an extension of time under § 1.136 for its timely submission, as constructively incorporating a petition for extension of time for the appropriate length of time pursuant 37 C.F.R. § 1.136(a)(3) regardless of whether a separate petition is included.

Respectfully submitted,
McDERMOTT WILL & EMERY LLP

Simona A. Levi-Minzi, Ph.D.
Registration No. 43,750
Attorney for Applicant

McDermott Will & Emery LLP
201 S. Biscayne Boulevard Suite 2200
Miami, FL 33131
Tel.: 305.347.6528 -- Fax: 305.347.6500
email: SLEVI@MWE.COM
Date: November 3, 2005